Avnet SpeedWay Design Workshops™

Lab 0 – Pre-Lab

Setting Up a Development Platform for Zynq

August 2016
Version 05

Lab Setup

To complete all of the Speedway labs, the following software and hardware setups are required.

Software

The recommended software for this Speedway is:

- O/S supported by Xilinx® Vivado® Design Suite 2016.2
  - See UG973 v2016.2 *Release Notes* for the supported list
  - Windows-7 64-bit was used to develop this Speedway
- Xilinx Vivado Design Suite 2016.2 (available for download free of charge from Xilinx website)
- MicroZed & PicoZed users:
  - Silicon Labs CP201x USB-to-UART Bridge Driver
    - www.microzed.org → Documentation → MicroZed Silicon Labs CP210x USB-to-UART Setup Guide v1.2
- ZedBoard users:
  - Cypress CY7C64225 USB-to-UART Driver
    - www.zedboard.org → Documentation → ZedBoard Cypress USB-to-UART Setup Guide
- 7-Zip file archiver tool
- Tera Term
- Adobe Reader for viewing PDF content
  - Adobe Reader X or later recommended for this SpeedWay

Hardware

The recommended target hardware consists of the following:

- PC with minimum amount of additional RAM available for Xilinx tools as specified at www.xilinx.com/design-tools/vivado/memory.htm for either the 7Z010 or 7Z020 device
    - 4GB required but 8GB recommended
- Integrated SD card slot or USB SD card reader device
- Avnet MicroZed Evaluation Kit or ZedBoard Development Kit
    - Includes necessary power supply, SD/microSD card, and one USB cable
- MicroZed & PicoZed users:
    - JTAG Programming Cable (Xilinx Platform Cable, Digilent HS1, HS2 or HS3 cables supported)
        - If you don't already have a JTAG Cable, Avnet recommends the Digilent HS3 Cable
        - www.em.avnet.com/jtaghs3
- ZedBoard users:
    - One additional USB cable (Type A to Micro-USB Type B) – *only one included in kit*

Lab Instruction Notes

Throughout all the Speedway labs, a generalized instruction is given. If you're comfortable completing the task based on that instruction, feel free to do so. If not, step-by-step instructions are provided.

Technical Support

For technical support with any of the labs, please contact your local Avnet/Silica FAE or visit the support forum for MicroZed, PicoZed and ZedBoard:

www.microzed.org/forum

www.picozed.org/forum

www.zedboard.org/forum

Additional technical support resources are listed below.

Evaluation Kit home pages with Documentation and Reference Designs

www.microzed.org

www.zedboard.org

www.picozed.org

Xilinx technical support

You may contact your local Avnet/Silica FAE or Xilinx Online Technical Support at www.support.xilinx.com . On this site you will also find the following resources for assistance:

- Software, IP, and Documentation Updates
- Access to Technical Support Web Tools
- Searchable Answer Database with Over 4,000 Solutions
- User Forums
- Training - Select instructor-led classes and recorded e-learning options

Avnet technical support

Contact your Avnet/Silica FAE or the forums for any additional questions regarding the PicoZed, MicroZed, or ZedBoard reference designs, kit hardware, or if you are interested in designing any of the kit devices into your next design.

Lab 0 Overview

This lab will provide appropriate guidance for setting up a suitable development platform under Windows 7 using the Xilinx Vivado Design Suite 2016.2 tools.

Lab 0 Objectives

When you have completed Lab 0, you will know how to do the following:

- Set up a Windows PC environment for Zynq development
    - Download, install, and license Xilinx Vivado Design Suite 2016.2
    - Install 7-Zip archive utility
    - Install Tera Term for use as a serial terminal
- Install appropriate target development board USB-UART drivers under Windows
- Obtain and extract the appropriate Speedway training files archive

Experiment 1: Install 7-Zip, Vivado 2016.2, License Vivado 2016.2

This experiment shows how to obtain and install the **7-Zip** archive utility.

There are known limitations to using the Windows Explorer Zip utility, specifically with respect to very long path names, which can cause problems when extracting archived Vivado projects.

The SpeedWay lab documentation assumes that the **7-Zip** archive utility is installed locally on the development PC. It is strongly recommended that **7-Zip** archive utility be installed so that the instructions in the subsequent lab activities can be followed exactly.

Experiment 1 General Instruction:

Download and install the most recent version of **7-Zip** installer and install this utility on your development PC. Download and install Vivado 2016.2 License your Vivado 2016.2

Experiment 1 Step-by-Step Instructions:

1. To download the latest version of 7-Zip, it can be accessed from the following URL:

   http://www.7-zip.org/

   Locate the 7-Zip installer and launch the installer by double clicking on the file.

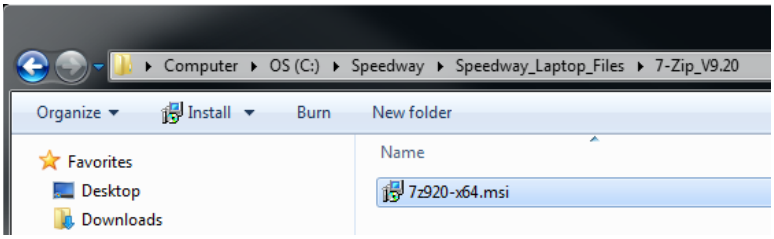

Figure 1 – Launching the 7-Zip Installer

2. Finish installation of 7-Zip

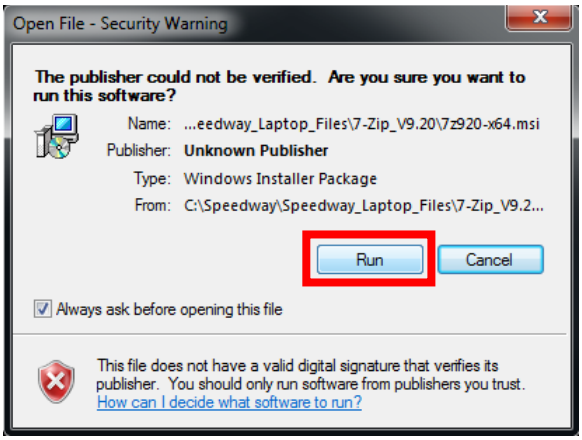

Figure 2 – 7-Zip Installation

3. Download the Vivado Design Suite 2016.2 from the Xilinx Downloads page which can be accessed from the following URL:

   http://www.xilinx.com/support/download.html

4. Use 7-Zip to unzip the Vivado Design Suite 2016.2 **tar.gz** file.

5. Start installation program.

6. Under the installation options list, make sure that the SDK option is selected (by default it is not selected) and use the default selection for the remaining options.

7. When the installation is completed the **Xilinx License Manager** will open.

8. Install the Vivado Design Suite License which can be accessed at

https://xilinx.entitlenow.com/AcrossUser/main.gsp?licenseType=&product=&tab=CreateLicense&req_hash=&uuid=&

9. Click on **Create New Licenses** and enter your voucher code then click **Redeem Now**.

   If you are unable to locate your voucher, skip ahead to the next step and follow the instructions to create a 30-day full evaluation license instead.

10. Once the voucher is redeemed, an additional board specific item will appear in the product entitlement table listing.

    If you are redeeming a voucher which comes with MicroZed, a new selection entitled **Avnet Zynq-7000 SoC MicroZed / PicoZed Board Voucher, Design Edition Node-Locked, Device Locked License** will appear in the product entitlement table listing.

    If you are redeeming a voucher which comes with ZedBoard, a new selection entitled **Zynq-7000 EPP 7Z020 ZedBoard Kit – ISE Design Suite: Design Edition Device Locked Node-Locked** will appear in the product entitlement table listing.

    If you are unable to locate your voucher, a 30-day full evaluation license can instead be generated by selecting the **Vivado Design Suite 30-Day Evaluation, Node Locked License** option. Keep in mind that this license option will expire after 30 days but will enable you to complete all of the activities from each of the SpeedWay courses within that evaluation period.

    Select the product entitlement table listing which corresponds to the board voucher which was redeemed in Step 2, and click on the **Generate Node-Locked License** button.

11. If the host PC you intend to develop on is not already listed in the Host ID drop down selection, select the **Add a host** option (under field 2) and enter in the corresponding host identification information. System information for the host is pre-populated in the option menu if you arrived at the Product Licensing Site from a link within the **Xilinx License Configuration Manager** (XLCM).

    The **Host ID Value** uniquely identifies the machine to which your design tools or IP is licensed. You may choose a **Host ID Type** to be a MAC address, a hard drive serial number, or a FLEXID Dongle ID.

    Note: Not all host ID types are supported for all operating systems. The easiest way to obtain host ID information for your PC is to run the **Xilinx License Configuration Manager** (as shown in Step 7) on the machine that will serve as the licensed host.

    The detected **Local System Information** displayed within the **Xilinx License Configuration Manager** window can be copied and pasted into the **Add a host…** text fields in order to reduce potential errors in entering the Host ID Value.

    Once the corresponding host identification information is entered, click the **Add** button.

12. Generate a node locked license by verifying the product selection, selecting the host PC you intend to develop on, and entering an optional comment which may help you identify the purpose of this license in the future. Once the required fields are populated, click the **Next** button to finish generating the license.

13. Select the license file entry which corresponds to the node locked license which was generated in Step 7. Then click on the **Download** (small downward pointing arrow) button to download a copy of the license file.

14. Open **Manage Xilinx License** (was opened after Vivado installation)

15. Once the **Xilinx License Manager** is open, click the **Load License** load along the side of the window.

16. Specify a certificate based license file for the Xilinx License Manager to copy by clicking on the **Copy License…** button and then selecting the **Xilinx.lic** file you downloaded

17. Once the license has been loaded, Vivado Design Suite is now licensed for development

Experiment 2: Installing the USB-UART Serial Driver

This experiment provides guidance on how to install an appropriate USB-UART serial driver for MicroZed, PicoZed, or ZedBoard development.

The MicroZed Evaluation Kit uses the Silicon Labs CP2014 USB-UART device and can be connected to a host PC via the Micro-USB connector J2.

ZedBoard uses the Cypress CY7C64225 USB-UART device and can be connected to a host PC via the Micro-USB connector J14.

Experiment 4 General Instruction:

Follow the installation guide for the USB-UART device on your development board.

MicroZed and PicoZed users will need to install drivers for the Silicon Labs CP2014 USB-UART by following the **Silicon Labs CP210x USB-to-UART Setup Guide** available from the MicroZed.org or PicoZed.org Documentation page.

ZedBoard users will need to install drivers for the Cypress CY7C64225 USB-UART by following the **Cypress CY7C64225 USB-to-UART Setup Guide** available from the ZedBoard.org Documentation page.

Experiment 2 Step-by-Step Instructions:

1. Follow the installation guide for the USB-UART device on your development board.

   MicroZed and PicoZed users will need to install drivers for the Silicon Labs CP2014 USB-UART by following the Silicon Labs CP210x USB-to-UART Setup Guide available from the MicroZed.org Documentation page.

   Silicon Labs CP210x USB-to-UART Setup Guide v1.2

   ZedBoard users will need to install drivers for the Cypress CY7C64225 USB-UART by following the Cypress CY7C64225 USB-to-UART Setup Guide available from the ZedBoard.org Documentation page.

   Cypress USB-to-UART Setup Guide

2. Once the appropriate USB-UART driver has been installed according to the separate setup guide document, proceed to the next experiment to continue setting up your development PC.

Experiment 3: Installing Tera Term

For the SpeedWay lab documentation, Windows 7 was used which does not come with a built in terminal application such as HyperTerm. The open source, free, software implemented, serial terminal emulator application **Tera Term** was used in all lab documentation which can be downloaded from the **Tera Term** project on this SourceForge Japan page:

http://ttssh2.sourceforge.jp

This experiment provides guidance on how to install **Tera Term** which can be used for MicroZed or ZedBoard development. Installing **Tera Term** is strongly recommended for following later lab document instructions. However, if you already have a preferred serial terminal emulator application which you feel comfortable using with development boards featuring a USB-UART device, this experiment can be skipped and your serial terminal emulator application substituted for **Tera Term** in all subsequent lab instructions.

Experiment 5 General Instruction:

Download the most recent version or locate the local **Tera Term** installer and install this utility on your development PC. Launch the installer and follow the on-screen prompts to install the Tera Term serial terminal emulation application.

Experiment 5 Step-by-Step Instructions:

1. You can download the latest version of Tera Term, it can be accessed from the following URL:

   http://ttssh2.sourceforge.jp

   Locate the Tera Term installer and launch the installer by double clicking on the file.

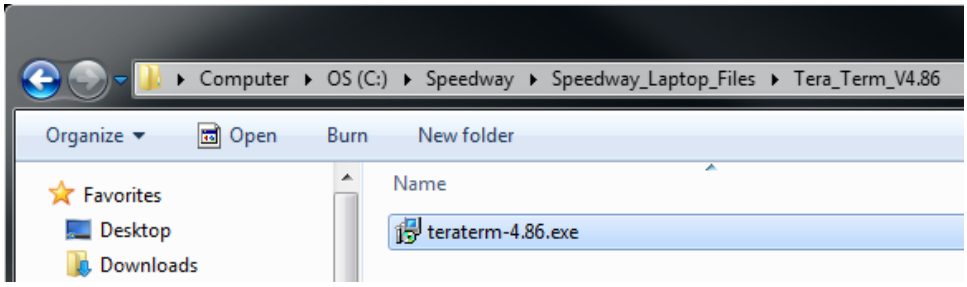

Figure 3 – Launching the Tera Term Installer

2. A User Account Control may display indicating that the publisher could not be verified. Since Tera Term is open source software and most open source software does not go through the digital signature publishing process, it should be safe to install this software on your local machine as long as the source of the software is well known. Click on the **Yes** button to continue launching the Tera Term installer.

3. A welcome screen is then displayed for the Tera Term setup wizard. Click on the **Next** button to continue installing Tera Term.

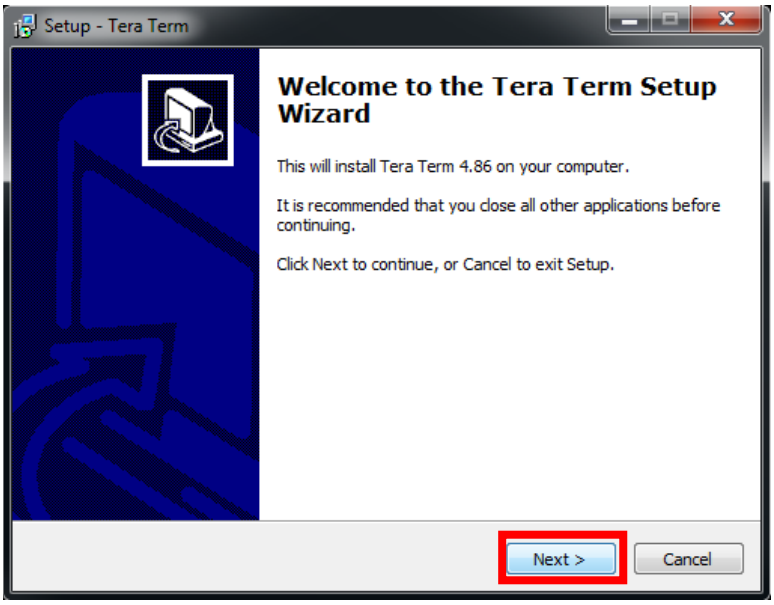

Figure 4 – Welcome to the Tera Term Setup Wizard

4. Read through the presented License Agreement. If you accept the terms of the agreement, click on the option **I accept the agreement** and click the **Next** button.

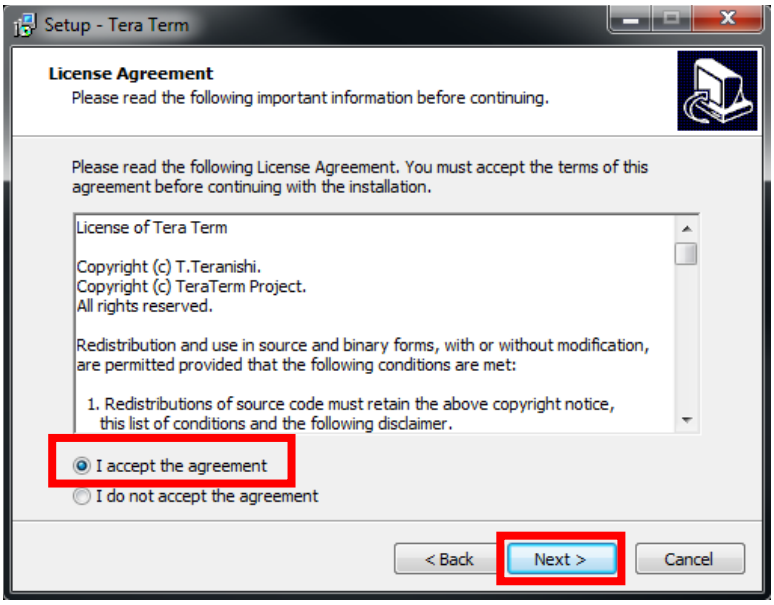

Figure 5 – Tera Term License Agreement

5. A destination location selection is then displayed, accept the default settings and click on the **Next** button to continue installing Tera Term.

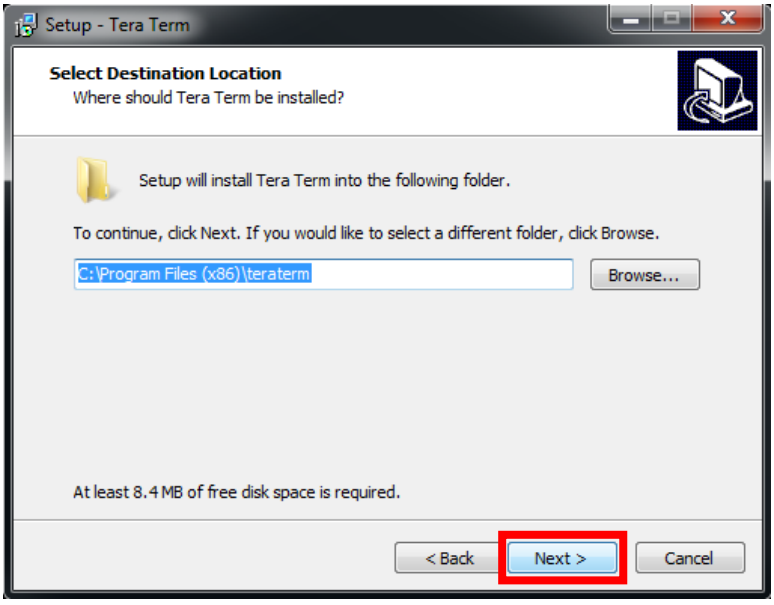

Figure 6 – Select Destination Location

6. A component selection is then displayed, accept the default settings and click on the **Next** button to continue installing Tera Term.

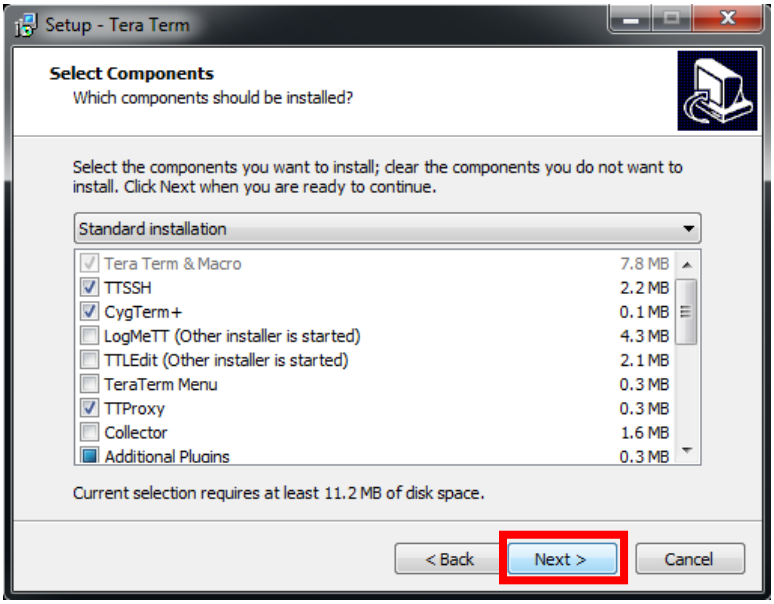

Figure 7 – Select Components

7. A language selection is then displayed, select the appropriate language for your region (English is strongly recommended) and click on the **Next** button to continue installing Tera Term.

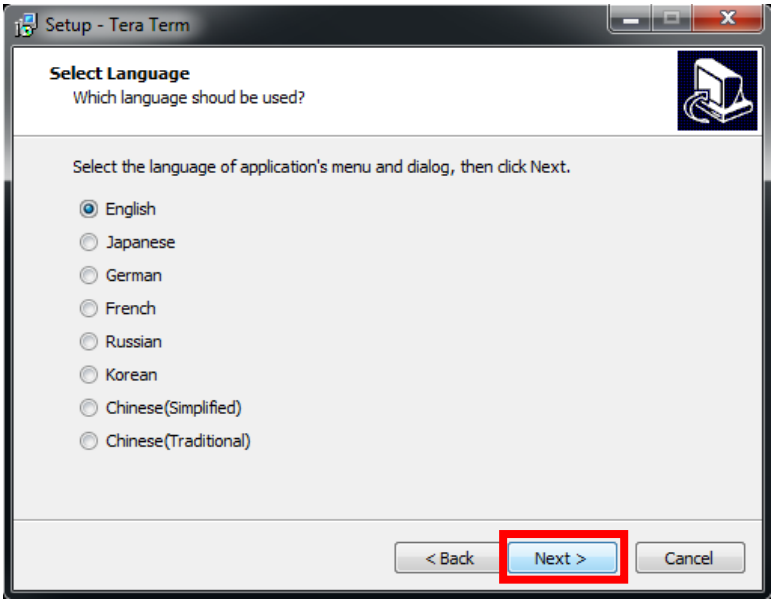

Figure 8 – Select Language

8. A start menu folder selection is then displayed, select the default settings and click on the **Next** button to continue installing Tera Term.

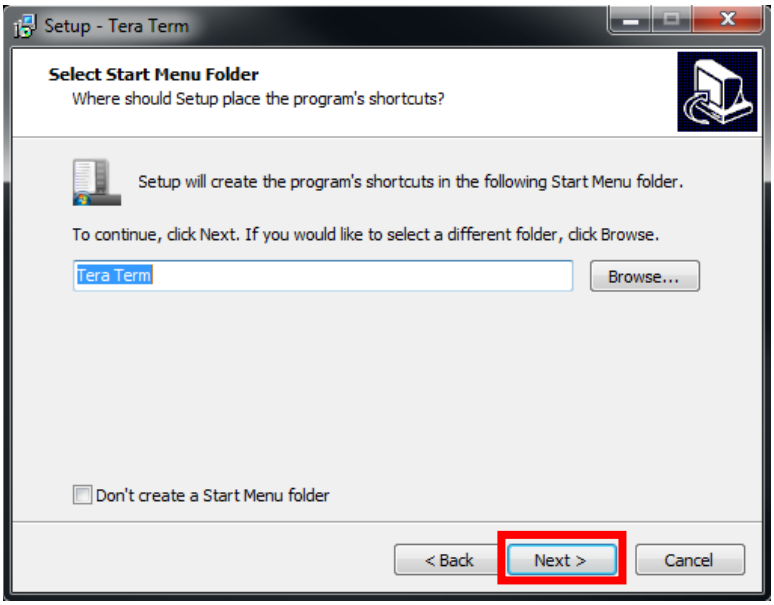

Figure 9 – Select Start Menu Folder

9. An additional task selection is then displayed, de-select the **Create Tera Term shortcut to Quick Launch** option and click on the **Next** button to continue installing Tera Term.

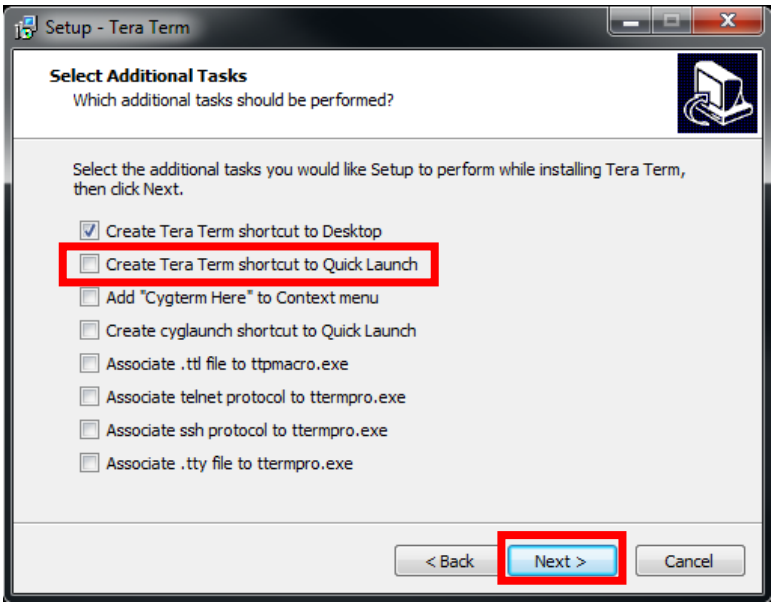

Figure 10 – Additional Task Selection

10. The Tera Term Setup Wizard is now ready to begin the installation. Click on the **Install** button.

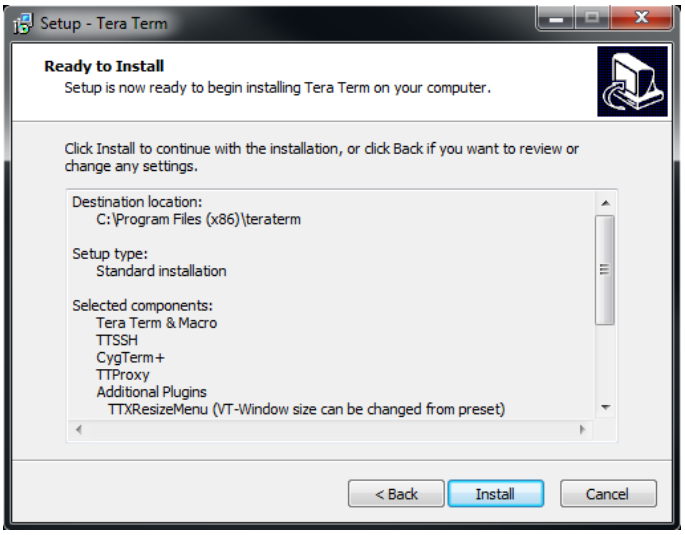

Figure 11 – Setup Wizard Ready to Begin Installation

11. Wait while the Tera Term installation continues which will complete after about 1 minute. During this time, several Access Control prompts may be displayed. Be sure to allow access to the installer in order to successfully complete the installation.

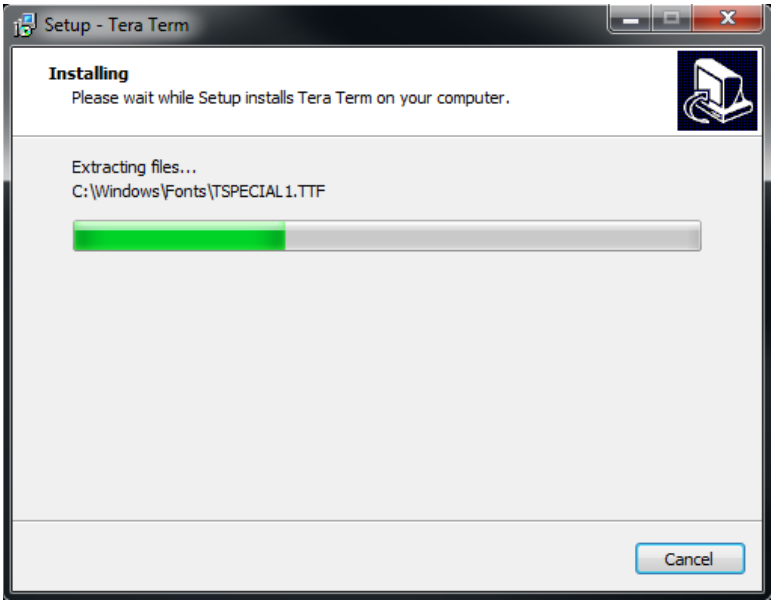

Figure 12 – Installation Underway

12. Once the Tera Term Setup Wizard has completed installation, click on the **Finish** button to close the Setup Wizard.

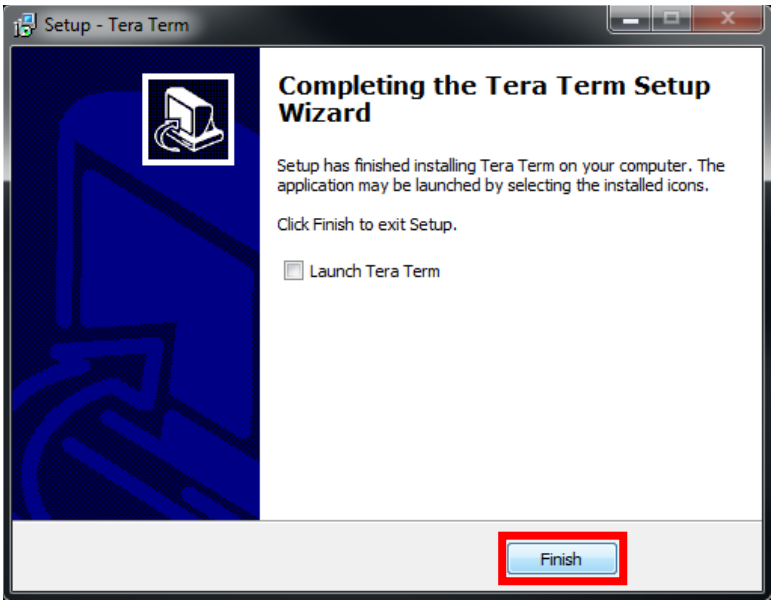

Figure 13 – Setup Wizard Completed Installation

13. Once Tera Term is installed you are ready to use your terminal program

Experiment 4: Setting Up SpeedWay Lab Files

This experiment provides guidance on how to setup the SpeedWay lab files relating to the corresponding courses.

MicroZed, PicoZed, and ZedBoard users attending the **Developing Zynq-7000 AP SoC Software** course will need to extract the contents of the **ZynqSW_2016_student.zip** file archive to the following folder:

C:\Speedway

MicroZed, PicoZed, and ZedBoard users attending the **Developing Zynq-7000 AP SoC Hardware** course will need to extract the contents of the **ZynqHW_2016_student.zip** file archive to the following folder:

C:\Speedway

Extracting the archives to the appropriate folders is required in order to follow course lab document instructions.

Experiment 4 General Instruction:

Extract the SpeedWay lab file archives relating to the corresponding courses to the appropriate local folders.

Experiment 4 Step-by-Step Instructions:
MicroZed, PicoZed, and ZedBoard users will utilize files coming from the same lab file archives for any given Speedway course.

1. Users attending the **Developing Zynq-7000 AP SoC Software** course will need to extract the contents of the **ZynqSW_2016_student.zip** file archive to the following folder:

   C:\Speedway

   Appropriate paths are included within the archive which will create a sub-folder structure containing lab instructions, slides, solution files, and support documents under the **C:\Speedway\ZynqSW\2016_2** folder:

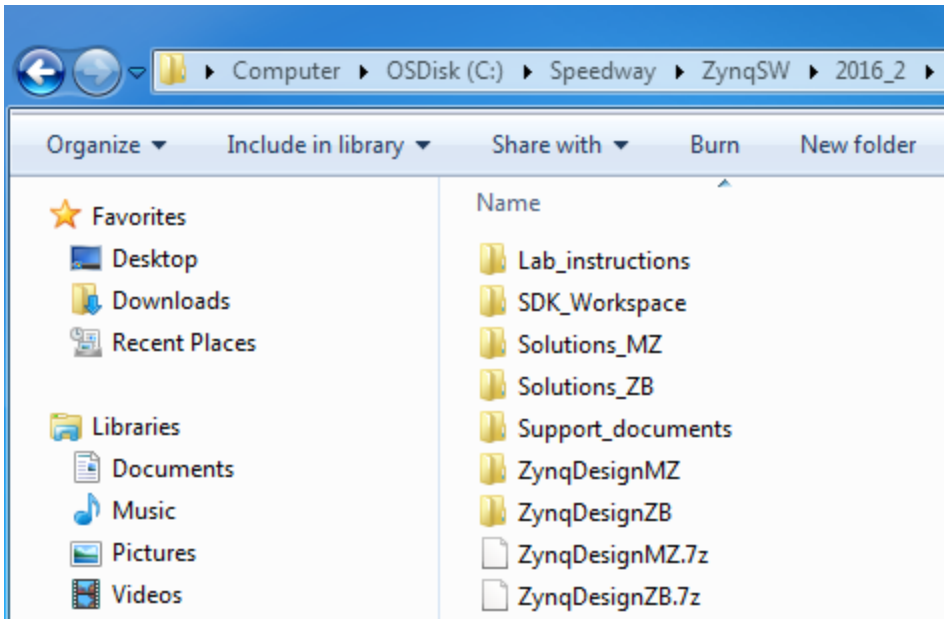

Figure 14 – Zynq Software Course Files Extracted

2. Users attending the **Developing Zynq-7000 AP SoC Hardware** course will need to extract the contents of the **ZynqHW_2016_student.zip** file archive to the following folder:

   C:\Speedway

   Appropriate paths are included within the archive which will create a sub-folder structure containing lab instructions, slides, solution files, and support documents under the **C:\Speedway\ZynqHW\2016_2** folder:

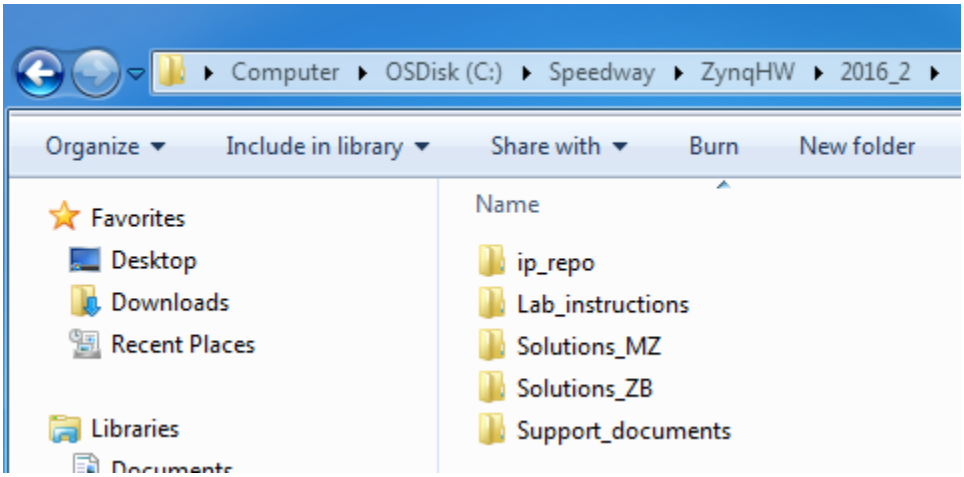

Figure 15 – Zynq Hardware Course Files Extracted

Revision History

Date	Version	Revision
12 Nov 13	01	Initial Release
20 Nov 13	02	Updated instructions on Cypress persistent USB-UART Driver
30 Nov 13	03	Updated instructions, not yet published
24 Mar 15	04	Update to 2014.4
10 Aug 16	15	Updated to 2016.2

Resources

www.microzed.org

www.picozed.org

www.zedboard.org

www.em.avnet.com/drc

www.xilinx.com/zynq

www.xilinx.com/sdk

www.xilinx.com/vivado